

The Role of Qualia in Machine Consciousness; Nothing or Everything? (The Answer Is Yes)

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Abstract

So far, what we believe to know about qualia is based on 1) subjective introspection, 2) the knowledge on the function of sensory organs and 3) some clever tests. The ongoing philosophical discussion about qualia seems to show that the subjective component is still the dominating one. The following treatment is no exception. However, the interpretation here is from the engineering philosophy; what could make sense in the terms of a possible artificial implementation. This rejects those philosophical definitions of qualia that exclude physical basis, e.g. Frank Jackson's (1982) definition of qualia as certain features of the bodily sensations and certain perceptual experiences, which no amount of purely physical information can deliver. The soundness of the engineering hypotheses may be eventually judged by the success of implementation. A good summary of contemporary machine consciousness research that includes qualia can be found in Aleksander (2007).

It is our subjective conclusion that our conscious experience of the world takes place via qualia. We believe to see, hear, smell, taste and feel the qualities of the world directly, exactly as they are. We perceive ourselves in the middle of everything and the world appears to be out there with its qualia. The perceived world is not a model or image inside our head, it is outside as such -or so it seems. When we inspect the world, we do not inspect a retinal image or the excitations of the cochlea, instead we believe to inspect the world directly.

Consciousness and qualia are related. There is no awareness of any entity without the possession of information about the entity. Perception is the brain's information acquisition process and the products of this process appear as qualia. The intensity and "richness" of qualia is not fixed; direct sensory perception may produce "rich" and "high-resolution" qualia while memories may contain very limited low-resolution qualia. According to this view percepts appear as qualia and there is no perception without qualia. (Nota bene, this statement actually defines qualia in this way.) When sensory and introspective percepts vanish, qualia vanish, too. There will be nothing left to be aware of and consequently consciousness will cease.

Are qualia qualities of the world out there ready to be detected? Are some flowers really yellow? Does sugar have sweetness? Why do some gases seem to have an odor while others are odorless? Let's consider an example of visual qualia. It is known that light with 560 nm wavelength gives the impression of "yellow". But, green and red together give the same impression of "yellow" even though no 560 nm wavelength is present. This is actually a direct consequence of the structure of the eye, but it also goes to show that a perceived color is not a real world property, instead it is just an impression created by the sensory system.

Where is taste and odor? Atoms and molecules do not have any intrinsic odor or taste; no smell or sweetness. These are not "emergent properties", either. Odor and taste are sensor effects. Molecule structure and chemical activity cause the reactions that are perceived as taste and odor. Examples like this lead to the conclusion: Qualia are not properties of the physical world, ready to be observed.

In technical terms, what the brain perceives are not the external stimuli, but the sensory system's reactions to those stimuli. It is proposed here that these are perceived as qualia. In the case of pain, the perceived entity is the global system reaction, which is triggered by the neural signals that indicate cell damage (Haikonen 2003).

According to this hypothesis qualia represent physical world properties. However, there is no absolute one-to-one correspondence between the physical world properties and qualia; this would be a matter of sensory process resolution and translation. The qualities of qualia are not necessarily "similar" to the real world qualities; no "sweetness" or "blueness" as a natural quality exists. There may be exceptions though, for instance, amodal qualities like rhythm and timing.

Thus, according to this hypothesis, qualia are generated inside, yet they appear as qualities of outside entities. How is this possible? Why the visually perceived world appears to be out there and not on the retina where the actual image is? Why the perceived sounds appear to come from outside and not from the ears?

Let's consider visual perception first. The eye has sharply defined gaze direction that facilitates visual inspection by changing the direction of visual attention. In this way the eye scans and inspects the external world, not the image on the retina. This inspection positions the inspected objects out there, because this interpretation complies with the subject's motions in the environment. Additional position cues are provided by stereo vision and optical focusing effort.

The ability to perceive sound coming from outside is usually attributed to the use of two ears. However, simple experiments show that two ears alone cannot generate the illusion of sound coming from a certain outside direction. Additional information must be acquired via head motion.

Thus the world appears to be out there because this appearance complies with our motions, small and large, in the world. This effect calls for a cognitive architecture that integrates sensory and motor modalities seamlessly.

How to make a system have qualia? It is possible to acquire information about an object without qualia by using indirect secondary symbols, a method that is usually used by the computer. (This is related to the "Mary argument" of Frank Jackson (1982). Mary gets indirect but "perfect" physical information about colors; obviously no qualia are present. When Mary actually sees colors, qualia are present, but her knowledge about these colors is not increased. Jackson argues that as no new physical information is supplied yet qualia appear then qualia must be non-physical. The fallacy of this argument should be obvious. Mary does get additional information when she sees colors; this information is about the sensor effects. See also Kastrup 2007)

Thus, in order to facilitate qualia do not make the system inspect secondary symbols. Make the system inspect the world via explorative acts and let the products of the perception system and system reactions reflect the results of this inspection. Use direct and transparent perception systems and integrate sensory and motor modalities seamlessly. (The Haikonen (2003, 2007) architecture is designed to work in this way).

In conclusion: what is the role of qualia in machine consciousness; nothing or everything?

– Everything! To be conscious in the way that we experience it is to have qualia (but the qualities of machine qualia need not to be similar to the qualities of human qualia).

– No role at all, if qualia are understood as some mysterious immaterial non-causal philosophical no-no ingredient.

References

- Aleksander, I. (2007). Modeling Consciousness in Virtual Computational Machines, Functionalism and Phenomenology. *Synthesis Philosophica* **44** (2/2007), 447 – 454
- Jackson, F. (1982). Epiphenomenal Qualia. *Philosophical Quarterly* **32** (1982), 127 – 36
- Haikonen, P. O. (2003). *The Cognitive Approach to Conscious Machines*. Imprint Academic, UK
- Haikonen, P. O. (2007). *Robot Brains: Circuits and Systems for Conscious Machines*. Wiley & Sons, UK
- Kastrup, B. (2007) *Haikonen defeats Mary; or does he?* Retrieved from:
<http://blogger.xs4all.nl/bkastrup/articles/310726.aspx>